

WHAT IS CLAIMED IS:

1. A method for controlling a refractive index of a dry plating film which comprises providing silicon carbide as a starting source, and subjecting the silicon carbide to dry plating while controlling a concentration of a reactive gas thereby forming a thin film, on a substrate, made primarily of silicon carbide and having a refractive index ranging from 1.4 to 2.8.
2. A method according to Claim 1, wherein said reactive gas consists essentially of a member selected from the group consisting of oxygen-containing, nitrogen-containing gases and mixtures thereof.
3. A method according to Claim 1, wherein a ratio of said reactive gas, which is indicated by $[\text{flow rate of the reactive gas} / (\text{flow rate of the reactive gas} + \text{flow rate of an inert gas}) \times 100]$ is within a range of 0 to 50%.
4. A method according to Claim 1, wherein the dry plating is sputtering.
5. A method according to Claim 1, wherein said silicon carbide used as the starting source consists essentially of a silicon carbide sintered product which is obtained by sintering a homogeneous mixture having a density of 2.9 g/cm³ or over and made of silicon carbide powder and a non-metallic sintering aid.
6. A method for controlling a refractive index of a sputter film, which comprises providing silicon carbide as a target, and subjecting the silicon carbide to sputtering while controlling making electric power against a target thereby forming, on a substrate, a thin film made primarily of silicon carbide which has a refractive index ranging from 1.4 to 2.8.

7. A method according to Claim 6, wherein said silicon carbide is sputtered while controlling a concentration of a reactive gas.

5 8. A method according to Claim 6, wherein the silicon carbide target consists essentially of a silicon carbide sintered product which is obtained by sintering a homogeneous mixture having a density of 2.9 g/cm³ or over and made of silicon carbide powder and a non-metallic
10 sintering aid.

9. A method for making a dry plating built-up film, which comprises providing silicon carbide as a starting source, and subjecting the silicon carbide to dry plating
15 while changing a concentration of a reactive gas continuously or intermittently, thereby depositing and forming, on a substrate, a thin film having different refractive indices along its thickness.

20 10. A method according to Claim 9, wherein said reactive gas is a member selected from the group consisting of oxygen-containing, nitrogen-containing gases and mixtures thereof.

25 11. A method according to Claim 9, wherein a ratio of said reactive gas, which is indicated by [flow rate of the reactive gas/(flow rate of the reactive gas + flow rate of an inert gas) × 100] is within a range of 0 to 50%.

30 12. A method according to Claim 9, wherein the dry plating is sputtering.

13. A method according to Claim 9, wherein said silicon carbide used as the starting source consists essentially of
35 a silicon carbide sintered product which is obtained by sintering a homogeneous mixture having a density of 2.9

g/cm³ or over and made of silicon carbide powder and a non-metallic sintering aid.

14. A method according to Claim 9, wherein said built-up
5 film is used as an anti-reflective film.

15. A method for making a sputter built-up film which
comprises providing silicon carbide as a target, and
subjecting the silicon carbide to sputtering while changing
10 making electric power against the target continuously or
intermittently, thereby depositing and forming, on a
substrate, a thin film having different refractive indices
along its thickness.

15 16. A method according to Claim 15, further comprising
changing a concentration of a reactive gas continuously or
intermittently.

17. A method according to Claim 15, wherein said silicon
20 carbide used as the starting source consists essentially of
a silicon carbide sintered product which is obtained by
sintering a homogeneous mixture having a density of 2.9
g/cm³ or over and made of silicon carbide powder and a non-
metallic sintering aid.

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18. A method according to Claim 15, wherein said built-up
film is used as an anti-reflective film.